Commonwealth Edison Company
Braidwood Generating Station
Route #1, Box 84
Braceville, IL 60407-9619
Tel 815-458-2801

ComEd

March 17, 1995
BW/95-0037

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Gentlemen:

The enclosed Licensee Event Report from Braidwood Generating Station is being transmitted in accordance with the requirement of 10 CFR 50.73 (a)(2)(i)(B), which requires a 30-day written report.

This report is number 95-001-00, Docket No. 50-457.

K.L. Kofron
Station Manager
Braidwood Generation Station

KLK/BJM/dla
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Enclosure: Licensee Event Report
No. 457-95-001-00

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution Center
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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Braidwood Unit 2	05000457	1 OF 7

TITLE (4) 2A MSIV Active Accumulator Nitrogen Precharge Pressure Found Too High Due To Equipment Failure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBERS
02	15	95	95	-- 001 --	00	03	17	95	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
	20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
M. Olson, Root Cause Team	(815)458-2801 x2028

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	SB	V	W165	Y						

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 2/10/95, Operations performed the quarterly MSIV Partial Stroke Test on the Unit 2 MSIV's. At that time they were unable to perform the accumulator blowdown on the 2A MSIV Active Train. The valve was determined to be Operable at the time due to the successful 10% valve stroke. An Action Request was written to troubleshoot a suspected problem with the blowdown 4-way valve. On 2/15/95, the blowdown 4-way valve was replaced. Further testing revealed that the blowdown function was Operable, however, there was an abnormally high nitrogen precharge pressure found on the Active side accumulator (4200 psi vs. 3600 psi). This high precharge is the reason that Operations originally thought the blowdown function did not work correctly. Because of the high nitrogen precharge pressure, all the hydraulic oil volume in the accumulator was used during the 10% valve stroke and the 4200 psi was due only to the nitrogen. With the nitrogen pressure at 4200 psi, the Active train was inoperable as there was not a sufficient hydraulic oil volume left in the accumulator to close the MSIV within the required closing time of 5 seconds as required by Technical Specification Surveillance requirement 4.7.1.5. The cause was determined to be leaking of the crosstie valves between the active and standby accumulators. There have been no previous occurrences at Braidwood.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

A. PLANT CONDITIONS PRIOR TO EVENT:

UNIT: Braidwood Unit 2 EVENT DATE: 02/15/95
EVENT TIME: 1130
MODE: 1 RX POWER: 100%
RCS [AB] TEMPERATURE/PRESSURE: NOT/NOP

B. DESCRIPTION OF EVENT:

There was no equipment inoperable at the beginning of this event that contributed to the severity of the event.

On 2/10/95, Operations was performing procedure 2BwOS 0.5.MS.1, Quarterly Main Steam Isolation Valve (MSIV) Partial Stroke Test. When the 10% stroke was performed on the 2A MSIV active accumulator side, all components needed to perform a 100% stroke were verified operable (the open/close circuit 4-way valve, "A" solenoid, and the active accumulator). Hydraulic pressure on the accumulator dropped from 5000 psig to 4200 psig, as is expected for this portion of the test. The fact that the 10% stroke worked proved that the open/close 4-way valve was properly aligning the accumulator to the system. The next step of the test required a blowdown of the active accumulator and verification of correct nitrogen precharge pressure (~3600 psig at NOT). However, when the test switch in the Main Control Room was placed in the blowdown position (C and D solenoids energized), nothing was seen, heard, or felt in the field to indicate a blowdown had occurred. Normal expectations are that accumulator pressure will drop to around 3600 psig and the hydraulic oil reservoir level will increase. Accumulator pressure was indicating around 4100 psig. Blowdown did not apparently function properly. However, when the test switch was placed back to "normal" after the blowdown attempt the accumulator began to recharge, verifying that the test 4-way valve was again aligning the accumulator to the system.

An action request was written to address the problem, and troubleshooting by Mechanical Maintenance (non-licensed) and the System Engineer (non-licensed) began. Items checked included verification that the accumulator outlet valve was open. This was found lockwired open at the appropriate 2½ turns. The fact that the 10% valve stroke test functioned properly proved that the outlet valve was properly set. When the active accumulator pumped back to 5000 psi, the installed gauge on that accumulator matched the

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

B. DESCRIPTION OF EVENT (continued):

installed pressure gauge on the standby accumulator. Although there may have been error in the active gauge, it would have had to be identical to any error in the standby gauge. Problems with the gauge calibration were discounted at this time. Pilot air pressure was checked and found to be where it should be at 80 psi. Both the C and D solenoids were checked and found to be energized during the blowdown mode as required. Proper venting of air through these solenoids was also verified, showing that the blowdown 4-way valve was receiving a proper air signal to shift it to the blowdown position. When this 4-way valve was given a blowdown signal, pressure in the active accumulator showed about a 100 psig decrease (from 4200 psig to 4100 psig). This is normal when a 4-way valve shifts due to internal leakage as the valve spool slides between ports. Also, the hydraulic pump stalled, indicating that the 4-way valve had shifted to either the mid position (all ports isolated) or to the blowdown (reservoir) position. This left two options as to the cause of the failure. First was a total lack of hydraulic fluid in the accumulator. Second was that the blowdown 4-way valve was only shifting 1/2 way and was hanging up in the mid position.

A total lack of hydraulic fluid in the accumulator was first considered as a cause of no blowdown, but this would indicate a very high nitrogen precharge in the accumulator. This abnormally high precharge was not considered as the most likely failure because precharges are accurately and routinely done by Operations via BwOP MS-5, and the oil level in the reservoir was not above the normal level. If the nitrogen precharge in the accumulator was high, not as much oil would be charged into the accumulator and the reservoir level would be abnormally high. Additionally, high nitrogen pressure was discounted as the sole cause of the failed blowdown because Operations had just successfully completed the 10% partial stroke, and if the observed 4100 psi accumulator pressure had been from nitrogen only, then there would have had to be exactly enough oil in the accumulator at the start of the event to perform one 10% stroke with no oil left over. This was considered a very unlikely scenario. All indications pointed to a defective blowdown test 4-way valve, which would not affect MSIV Operability. The System Engineer made the determination that the MSIV was operable, even with a defective blowdown 4-way valve, due to the fact that the valve had performed a 10% stroke successfully and the accumulator pressure was restored to 5000 psig after the test switch was returned to normal. Preparations were made to change out the blowdown 4-way valve.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

B. DESCRIPTION OF EVENT (continued):

On 2/15/95, the blowdown 4-way valve was changed out on the 2A MSIV active side accumulator. The accumulator was charged back up to a pressure of 5000 psig and a 10% partial valve stroke was successfully performed. The pressure in the accumulator dropped to 4300 psig (expected). The blowdown test was then executed. A rag placed on the reservoir breather to prevent hydraulic oil from possibly blowing out of the reservoir during the test was lifted off the vent when the blowdown was performed. This showed that blowdown had definitely occurred, however the indicated accumulator pressure was reading 4200 psig. For the given room temperature, a precharge of 3600 psig would be expected. A 4200 psig accumulator precharge pressure is outside the operability bounds. The operator in the field was directed to bleed off 600 psig of nitrogen to reduce the precharge to within the pressure bounds of procedure BwOP MS-5T2, (Temperature/Pressure Limits). The active side accumulator was allowed to recharge to a pressure of 5000 psig. Both the 10% partial stroke and blowdown tests were repeated satisfactorily.

Given the above information, it is evident that the active side accumulator on the 2A MSIV contained too high a nitrogen precharge pressure and was inoperable following the failure of the surveillance run by operations on 2/10/95. This rendered the 2A MSIV inoperable for a period of time which exceeded the 48 hours allowed by Technical Specification 3.3.2.

The design function of the Main Steam Isolation Valve (MSIV) is to close within 5 seconds after receiving an ESF actuation signal. To do this, two safety related, captive nitrogen accumulators provide high pressure hydraulic fluid to the valve actuator ram through two fully redundant hydraulic circuits. A 4-way hydraulic valve is used to control the actuator ram direction to open or close the MSIV. The shifting of this valve is done by air which is controlled by A and B solenoids. All solenoids are normally de-energized with the MSIV open at power.

A second 4-way valve is used to line up the accumulator to either the hydraulic opening and closing circuit, or to the reservoir (blowdown) for testing. The shifting of this second 4-way valve is done by C and D solenoids. With both the C and D solenoids de-energized, air is ported to the 4-way valve such that the accumulator is lined up to the open and close hydraulic circuit. This is the normal configuration when the MSIV is open at power. When the C and D solenoids are energized, air is ported to this 4-way valve such that the accumulator is lined up to the reservoir and all hydraulic fluid in the accumulator is dumped to the reservoir. This allows checking of the remaining nitrogen (precharge) pressure in the accumulator.

B. DESCRIPTION OF EVENT (continued):

A clearly defined temperature-pressure curve is used to determine the required precharge pressure on the accumulators and maintain a correct ratio of nitrogen to hydraulic fluid.

An empty, uncharged accumulator will first be completely filled with nitrogen. This is referred to as the precharge pressure and is determined by the ambient temperature. This precharge pressure is also the minimum pressure available to the actuator to close the MSIV at the end of the close stroke. This is a captive volume and is not withdrawn or mixed with the hydraulic oil during valve operation due to a sealed, floating piston inside the accumulator separating the nitrogen and hydraulic fluid. In order to hydraulically charge the accumulators, a small, non-safety related air driven hydraulic pump is utilized. This is a positive displacement pump and has a given hydraulic output pressure for a given air input pressure.

The input air pressure is adjusted for a hydraulic output pressure of 5000 psig. During normal operations, the accumulator will continue to "charge" until both the hydraulic and nitrogen pressures are at 5000 psig. The internal accumulator piston floats as hydraulic oil is charged into the accumulators. At this point, the pump stalls and the accumulators are ready to close the MSIV within the required 5 seconds.

As the temperature in the MSIV room increases during power operations, the pressure in the accumulators also increases (the mass balance between the nitrogen and hydraulic fluid remains constant). In order to adjust accumulator pressure as temperature increases, a precharge (or blowdown) test is performed. This test releases the accumulator's hydraulic fluid to the reservoir. Nitrogen pressures are then checked and adjusted, if required, based on the accumulator temperature. Maximum and minimum pressure lines found on the precharge graph bound the operability limits for that accumulator and thus, that MSIV's train.

This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B)- any operation or condition prohibited by the plant's Technical Specifications.

C. CAUSE OF EVENT:

The primary cause of the overpressure in the active accumulator is attributed to Equipment Failure. One or more crosstie valves in the nitrogen header connecting the active and standby accumulators were found to be leaking. This active nitrogen gas space is crosstied via two normally closed manual isolation valves. A check of these valves confirmed that there was indeed leakage past at least one of the normally closed

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C. CAUSE OF EVENT (continued):

valves. Each accumulator is normally tested individually for a partial stroke and blowdown test. During this test, a pressure differential is set up for at least 30-45 minutes while the hydraulic pump restores accumulator pressure to normal. It appears that a mass transfer of nitrogen occurred from the standby accumulator to the active accumulator during this test on 11/12/95, as each was found to be exactly 700 psig off the as-left pressure, active high and standby low, that MMD charged them to on 11/02/94.

Numerous other failure modes were investigated following this event. All but the above have been discounted as being the most probable mechanism of failure.

D. SAFETY ANALYSIS:

The safety implications of the high nitrogen precharge is that the valve would not have gone fully closed within the required 5 seconds as specified in Technical Specification Surveillance Requirement 4.7.1.5, if it had received a close signal on the active train only. However, the valve would have closed within the required time limit of 5 seconds if a SSPS train "B" Main Steam Isolation Signal had been received. Train "B", the standby accumulator, remained Operable throughout this event. If a manual closure signal was given to the 2A MSIV using the control switch on 2PM06J in the Main Control Room, the valve would have gone 96% closed within 3 seconds, and would then have pumped fully closed via the air driven hydraulic pump, within 30 seconds. Typically, this manual control switch is only used for opening or closing a MSIV in mode 4, since any abnormal plant condition requiring manual steam line isolation will direct the NSO to verify/actuate the MS Isolation switches on either 2PM05J or 2PM06J. These control switches give an automatic close signal to both the "A" and "B" train of all MSIV's. In addition, should the MSIV fail to close completely, the Emergency Operating Procedures contain contingency actions for the operators to perform to address this event. The safety significance of this event was minimal, since the redundant train "B" hydraulic system on the 2A MSIV would have closed the valve within the required 5 seconds during almost any plausible event, for example, testing of a train.

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E. CORRECTIVE ACTIONS:

Inspections were performed on all MSIV nitrogen isolation valves on both Unit 1 and 2. Leakage was identified on both the 2A and 2D MSIVs. Action requests #950008845, 950008855, 950008856, and 950008858 have been written to inspect and repair/replace all nitrogen cross tie manual isolation valves for the 2A (two valves) and the 2D (two valves) MSIV.

During the investigation, several other enhancements to the MSIV procedure, unrelated to this event, were identified as being warranted. These are being tracked outside of this LER.

F. PREVIOUS OCCURRENCES:

There have been no occurrences of this type previously at Braidwood Station.

G. COMPONENT FAILURE DATA:

MANUFACTURER	NOMENCLATURE	MODEL	MFG PART NO.
Whitey Co.	"HN" Series Severe Service Needle Valves	SS-6HNBF8	N/A